

ISAMU UEMASU ET AL.
USSN 10/009,627
REPLY TO OFFICE ACTION DATED JUNE 29, 2004
AMENDMENT OF DECEMBER 29, 2004

CONDITIONAL PETITION FOR EXTENSION OF TIME

If entry and consideration of the amendments above requires an extension of time, Applicants respectfully request that this be considered a petition therefor. The Commissioner is authorized to charge any fee(s) due in this connection to Deposit Account No. 14-1263.

ADDITIONAL FEE

Please charge any insufficiency of fees, or credit any excess, to Deposit Account No. 14-1263.

REMARKS

Applicants respectfully request reconsideration and allowance of this application in view of the amendments above and the following comments.

Amendments have been made to claim 8. A mark-up showing the changes that have been made to claim 8 using strikethrough and underlining appears above.

Applicants do not believe that any of the changes to claim 8 constitutes new matter. The phrase "provided in said aqueous phase to prevent said two or more organic phases" was originally in claim 8 as first set forth in the Response to Restriction Requirement and

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Amendment dated August 4, 2003. However, this phrase was inadvertently left out in the Amendment under 37 CFR 1.111 dated January 22, 2004. Accordingly, this portion of the amendments made to claim 8 is merely restorative. The other changes to claim 8 are merely believed to be clarifications. In particular, Applicants have rewritten claim 8 to recite positive method steps, and to provide other editorial clarifications. Thus, Applicants do not believe that any of the changes to claim 8 constitutes new matter.

Claims 3-5 and 8 were rejected under 35 USC § 112, second paragraph, as being indefinite. In response, Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

According to the Examiner, the term “substantially” in claim 8 is a relative term, which renders the claim indefinite. However, MPEP § 2173.05(b) specifically provides that “[t]he fact that claim language, including terms of degree, may not be precise, does *not automatically* render the claim indefinite under 35 U.S.C. 112, second paragraph.” According to that same section, “[a]cceptability of the claim language depends on whether one of ordinary skill in the art would understand what is claimed, in the light of the specification.” Thus, that same section provides that:

“When a term of degree is present in a claim, first a determination

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is to be made as to whether the specification provides some standard for measuring that degree. If it does not, a determination is made as to whether one of ordinary skill in the art, in view of the prior art and the status of the art, would be nevertheless reasonably apprised of the scope of the invention."

According to the Examiner, the instant specification does not provide a standard for ascertaining the requisite degree. However, Applicants point out that the specification in the last line on page 4 continuing over to page 5, line 8, teaches the following:

"When the organic phase of raw material is dissolved into the organic phase of extraction solvent, selective separation is not effected as a matter of course. In this case, the aqueous phase existing between the organic phase of raw material containing a compound(s) to be separated and the organic phase of extraction solvent may be partitioned with a diaphragm permeable to the aqueous solution but hardly permeable to oil droplets to prevent the organic phase of raw material dispersed in the aqueous cyclodextrin phase from migrating into the organic phase of extraction solvent."

The specification at page 2, lines 3-6, further teaches that:

"[T]he term '*selective*' used herein refers to a selectivity with

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which there can be attained an improvement in the purity of a compound as an object of separation, which is sufficient enough to provide a possibility of *developing an industrially useful process.*"

Consequently, Applicants submit that persons skilled in the art would understand from the instant specification that the phrase "substantially impermeable" indicates that the degree of the impermeability of the diaphragm is enough to provide a possibility of developing an industrially useful separation process. Accordingly, Applicants disagree that the specification does not provide a standard for ascertaining the requisite degree; the specification provides that the standard is that sufficient to be considered as a possibility for an industrially useful separation process.

Even if the specification did not provide any such standard, the Examiner would still need to consider what persons skilled in the art would have understood from the art itself. The Examiner says one of ordinary skill in the art would not be reasonably apprised of the scope of the invention, but does not provide any detailed explanation in support. Applicants contend that persons skilled in the art would be reasonably apprised of the scope of "substantially impermeable" by their own knowledge of the state of the art. In this regard, Applicants point out that the phrase "substantially impermeable" is a common phrase, particularly in patents, and, therefore, has a well known meaning to persons skilled in the art. In this regard, Applicants have

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attached the first page of the results of a search of U.S. patents, conducted on the USPTO website, which shows nearly 1200 U.S. patents containing claims containing the phrase "substantially impermeable." Applicants submit that this is sufficient to show that the phrase is in common usage, and, thus, has accepted meaning in the art.

In view of the foregoing, Applicants respectfully request that the Examiner reconsider and withdraw this rejection. An early notice that this rejection has been reconsidered and withdrawn is earnestly solicited.

Claims 3-5 and 8 were rejected under 35 USC § 103(a) as being obvious over Uemasu et al. ("Uemasu"), U.S. Patent No. 5,177,302, in view of Armstrong et al. ("Armstrong"), Anal. Chem., 59: 2237-2241 (1987). In response, Applicants respectfully request that the Examiner reconsider and withdraw this rejection.

At the outset, Applicants would like to point out that contrary to the Examiner's assertion Uemasu (US 5,177,302) does not disclose the separation of xylene isomers. The Examiner may be thinking of Uemasu's other U.S. Patent No. 5,095,173. Clarification on this point is respectfully requested.

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The Examiner has recognized that Uemasu differs from the Applicants' invention in that Uemasu does not disclose the use of diaphragm or membrane in the separation process. Since Armstrong also fails to disclose such a way of using a diaphragm as disclosed in the instant application, the combination of Uemasu and Armstrong cannot teach or suggest the instant claims, and, therefore, the instant application should not be rejected. The liquid membrane in Armstrong is utterly different from the diaphragm in the present invention. The liquid membrane in Armstrong corresponds to the entire aqueous phase of an aqueous solution of inclusion-complexing agent, whereas the diaphragm in the present invention is a partition provided in the aqueous phase to prevent two or more organic phases in respective oil droplet forms from mixing with each other via the aqueous phase when stirring is done. More specifically, the diaphragm in the present invention is provided, or disposed, in the middle of the aqueous phase existing between the two or more organic phases, so that oil droplets of the organic phase of raw material can be prevented from migrating to the organic phase of extraction solvent while oil droplets of the organic phase of extraction solvent can also be prevented from migrating to the organic phase of raw material.

As already described in the amendment filed on January 22, 2004, Armstrong discloses two types of chambers that were used to form liquid membranes. The first type consisted of two identical glass chambers sealed together against an O-ring and a paper support as shown in Figure IA on page 2238, right column. The paper support was impregnated with a cyclodextrin

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solution by dipping filter paper in the cyclodextrin solution to form a very thin liquid membrane (page 2238, right column, lines 3-5). The paper support in Armstrong is not a liquid membrane in itself, and is utterly different in function from the diaphragm in the present invention. The diaphragm in the present invention is used not to support a very thin liquid membrane, but to prevent two or more organic phases in respective oil droplet forms from mixing with each other when stirring is done. In this chamber, oil droplets of the organic phases are not formed in the cyclodextrin solution because the liquid membrane supported by filter paper has not liquid space enough to allow oil droplet formation.

According to the method of the present invention, oil droplets of the organic phases are positively formed in the aqueous phase of cyclodextrin solution by stirring at least neighborhoods of the respective liquid-liquid interfaces. During stirring, the diaphragm secures separation of the two or more kinds of organic phases in respective oil droplet forms. Further, use of the diaphragm can improve the contact efficiencies because the organic phase of raw material and the organic phase of extraction solvent can be vigorously stirred together with the aqueous cyclodextrin solution by virtue of the diaphragm, whereby the rates and efficiencies of inclusion complexation and dissociation extraction can be enhanced (page 5, lines 16-21 in the instant specification).

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The contact areas of the organic phases with the aqueous phase in Armstrong are limited to those of both surfaces of a piece of an aqueous liquid membrane to make the separation efficiency poor and unsuitable to large scales of industrial separations. The liquid membrane in the first type of chamber of Armstrong is formed of an aqueous cyclodextrin solution infiltrated into filter paper, and is never considered usable in large scales of industrial separations from the viewpoint of strength, durability, etc, of the liquid membrane. The liquid membrane is believed to be destroyed and hence lowered in performance with the lapse of time because it is so thin that the cyclodextrin solution may partly be peeled off by stirring.

The second type consisted of a capillary tube without use of filter paper as shown in Figure 1B on page 2238, right column. The very thin liquid membrane is believed to be formed by surface tension of an aqueous cyclodextrin solution, and is not supported by a paper support. This capillary tube cannot be used for large-scale industrial separation. Please refer to the description reading "The capillary chambers were used when there was a limited amount of isomeric material available for the experiment (as in the case of enantiometric mixtures)" on page 2238, left column, lines 50-53, and the description reading "Chamber B is used when a limited amount of a compound is available for testing," in the Caption to Figure 1 on page 2238. That is, the second type of chamber was used to separate such slight amounts of substances that even a liquid membrane infiltrated into filter paper may not be used.

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The Examiner has asserted that one skilled in the art would have had a reasonable expectation for success in combining both references to provide continuous and selective inclusion separation method by utilizing at least two liquid-liquid interfaces between an organic phase containing a compound to be separated and an aqueous solution of inclusion-complexing agent (cyclodextrin). However, combination of the liquid membrane of Armstrong with the separation method of Uemasu does not provide the method of the present invention because the structures of the chambers of Armstrong are not varied at all by the combination with only replacement of enantiomers and other isomers of Armstrong with isomers of disubstituted benzenes of Uemasu. The chambers of Armstrong cannot be used to carry out the method of the present invention as described hereinbefore in detail. Thus, the Examiner's assertion is not well taken, and Applicants respectfully request that the Examiner reconsider and withdraw it.

An early notice that this rejection has been reconsidered and withdrawn is earnestly solicited.

Applicants believe that the foregoing constitutes a bona fide response to all outstanding objections and rejections.

Applicants also believe that this application is in condition for immediate allowance. However, should any issue(s) of a minor nature remain, the Examiner is respectfully requested to

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telephone the undersigned at telephone number (212) 808-0700 so that the issue(s) might be promptly resolved.

Early and favorable action is earnestly solicited.

Respectfully submitted,

NORRIS MC LAUGHLIN & MARCUS, P.A.

By

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CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that the foregoing Amendment under 37 CFR § 1.111 and the accompanying Search Report (1 page) and Petition for Extension of Time (1 page) (16 pages total) are being facsimile transmitted to the United States Patent and Trademark Office on the date indicated below:

Date: December 29, 2004

By:

Kurt G. Briscoe